Precision Engagement

LOCKHEED MARTIN

We never forget who we're working for™

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Evolution Of “Precision Engagement”

- XYZ coordinates are much better
  - Four meters or better CEP demonstrated with GPS only
  - One meter CEP demonstrated with seekers
- Collateral damage is less
- Fixed or relocateable targets

Seeker Guidance

High Value Targets

HDBT

GPS Guidance

Better Accuracy Is Today’s Precision Engagement

What Is The Next Challenge In Precision Engagement

XYZ Accuracy

Plus

“Precise Timing”

Characteristics Of “Time”

- XYZ plus time
  - Time = Tracking error for movement (xyz / time)
  - Time = Enemy driven opportunities (short reaction windows)
  - Time = Enemy driven complexity of engagement (evasive or concealed)

Complexities Of Engaging Ground Targets

Evasive Targets	Concealed Targets
Decoys (EO / IR / RF / Laser)	Urban Area
Erratic Vector (Movers)	Law of Armed Conflict Exploitatio
Jamming (EO / IR / RF / Laser / GPS)	Collateral Damage
Cooperative Tactics	Camouflage
Deception (SUV, Bus in Convoy)	Clutter (IR / Radar / RF / Laser)
Counter-fire	Buried
At Range	Hardened
Even Small Targets	Weather
Short Reaction Windows	Day / Night

Two Ways To Approach Evasive Targets and Concealment

Speed	Persistence	
RATTLRS	TAC TOM	LCMCM
HiFLY	SLAM-ER	Dominator
FALCON	JASSM / ER	High Altitude Airship

Effects of Speed And Persistence

✓ Persistence
✓ Speed

Evasive Targets	Concealed Targets
✓ Decoys (EO / IR / RF / Laser)	✓ Urban Area
✓✓ Erratic Vector	✓ Law of Armed Conflict (Exploitat
✓ Jamming (EO / IR / RF / Laser)	✓ Collateral Damage
✓ Cooperative Maneuvers	✓ Camouflage
✓ Deception (SUV, Bus in Convoy)	✓ Clutter (IR / Radar / RF / Laser)
✓ Counter-fire	✓ Buried
At Range	✓ Hardened
Even Small Targets	✓ Weather
Affordably	✓ Day / Night
✓✓ Short Reaction Windows	

A Digression

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The Air-To-Air Analogy

Problem	Air-to-Air	Ground Moving Target Solution
Jamming/Clutter	Separate RF & IR Seekers Future: Multi-mode seekers	Separate EO, IR, SAL Seekers Future Multi-mode Seekers
Weather/Night	RF Seeker	Non
Collateral Damage	Target ID (RF-SOME EO + Off Board) Precision	Target ID (Eyeball ff Board) Precision
Evasive Targets	Separate RF & IR Seekers/Gun Close to Engage Future: Multi-mode Seeker	Separate E , SAL Seekers/G Close to E ge Multi-mod eker
Battlespace Awareness	AWACS with Data Link Future: GIG	JSTARS/Pr or/Global Hawk WDL, GIG

Spirals In Ground Attack Could Parallel Spirals In Air-to-Air

Army Ground Moving Target Solution

Joint Common Missile – 2008

Longbow – 1998

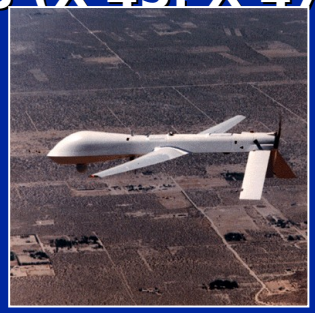
Hellfire II – 1993

= RF

“Persistence” In Precision Engagement

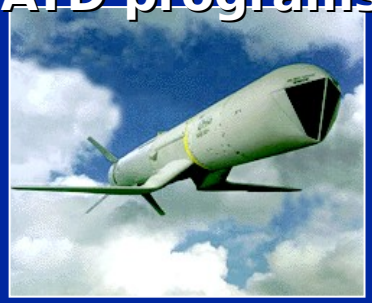
Surveilling assets with weapons

- Predator
- C-130
- P-3
- IUCAS (X-45, X-47)



Weapons with surveilling capability

- SLAM-ER
- JASSM
- SDB II
- ACTD/ATD programs



Shouldn’t Weapons Surveille If They Have Seekers, Persistence, And Connectivity?

Surveilling Weapons

- Must provide various degrees of persistence based on mission
- Should be low cost, high density assets. Expendable by definition.
- Pre-position weapons based on best available data
  – Where “should” the target be? (PBA)
- Receipt of surveillance information in a timely manner results in precise engagement

Weaponized Surveillance	Surveilling Weapons
• Few assets • Expensive • Threat Dependent • Recoverable	• Many assets • Low Cost (shoot down is OK) • Cooperatively linked • Expendable

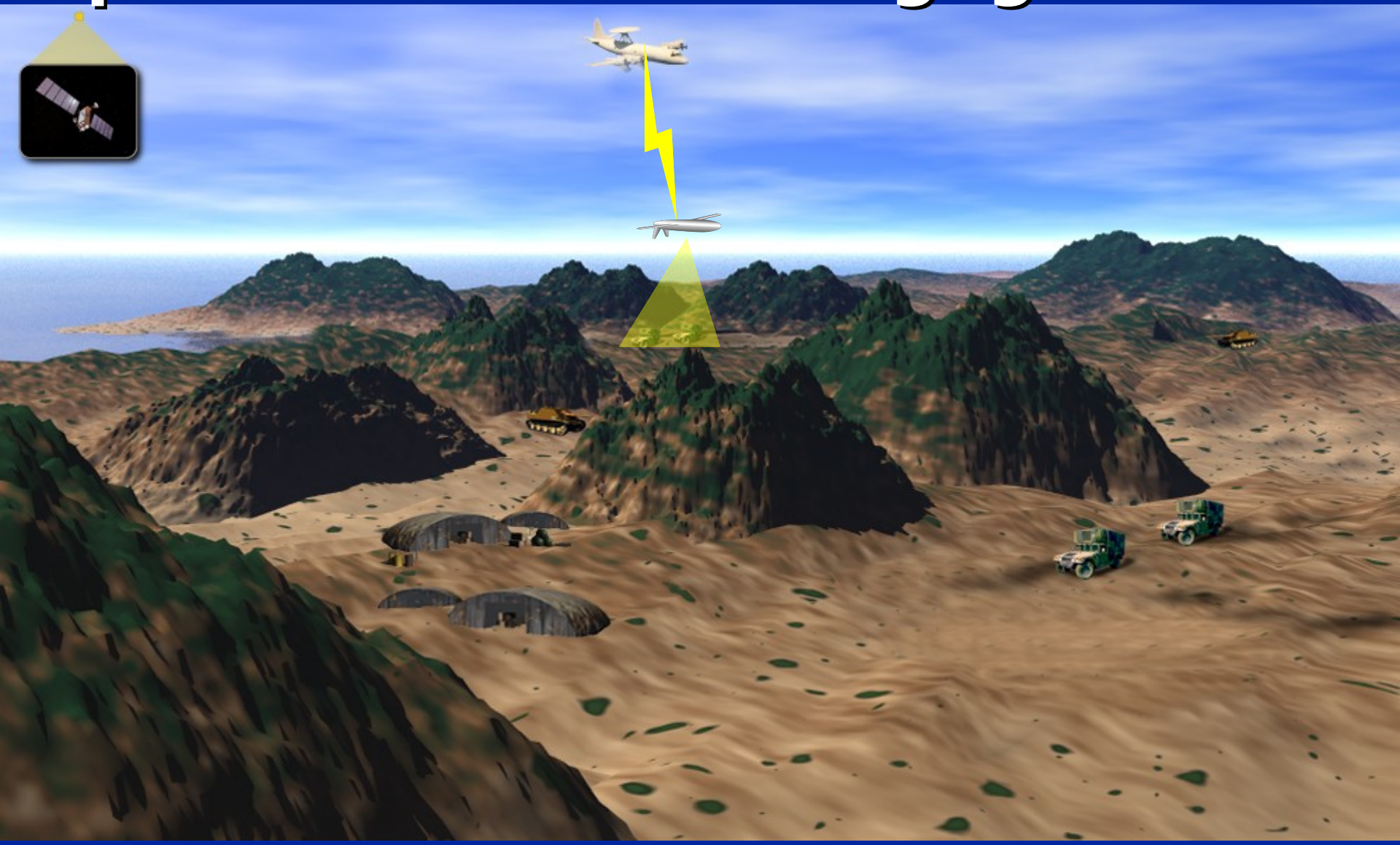
Key Is Affordability:

Data Links = Small $

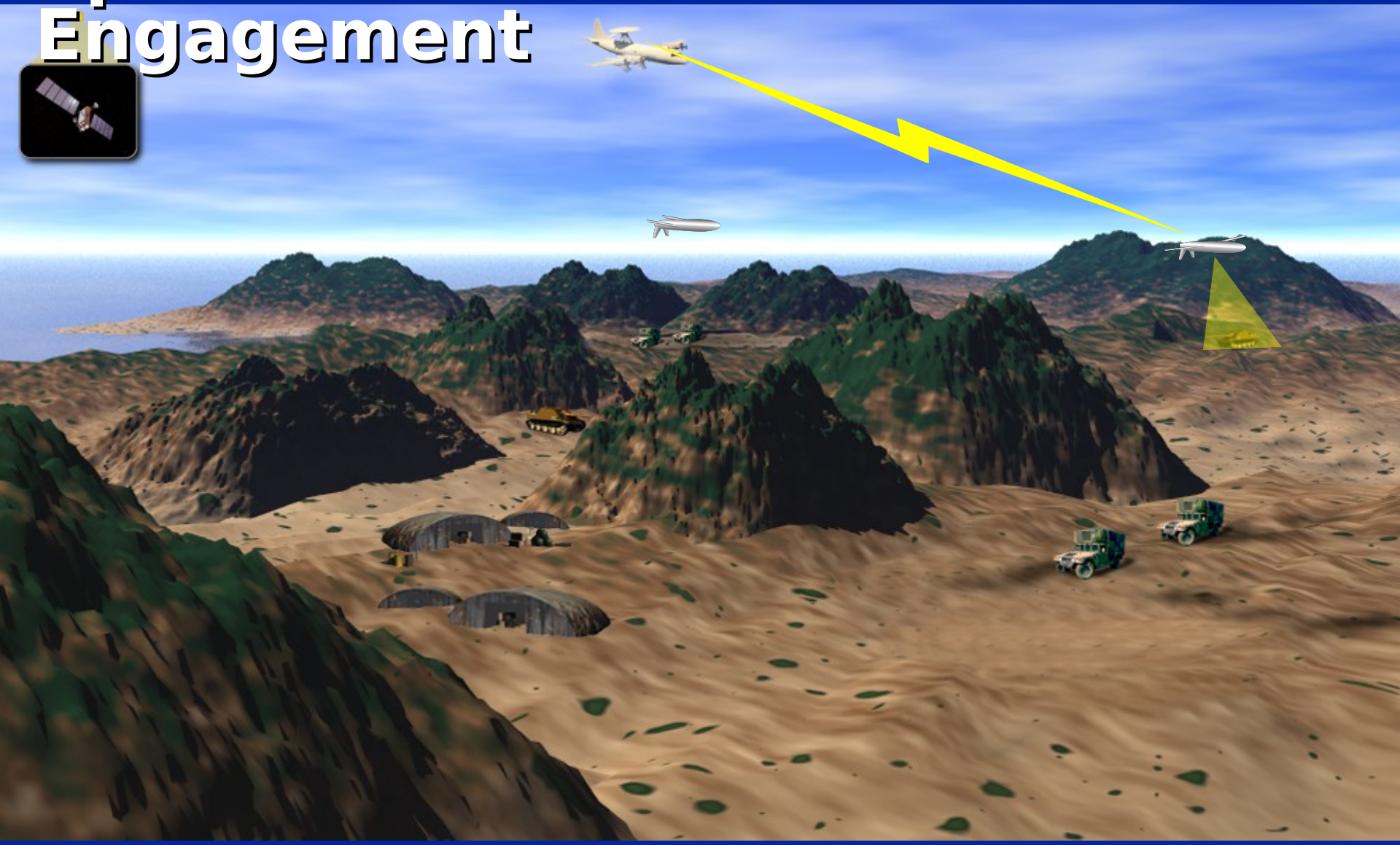
Seekers = Small / Medium $

Persistence = Small $

Speed In Precision Engagement



Speed In Precision Engagement



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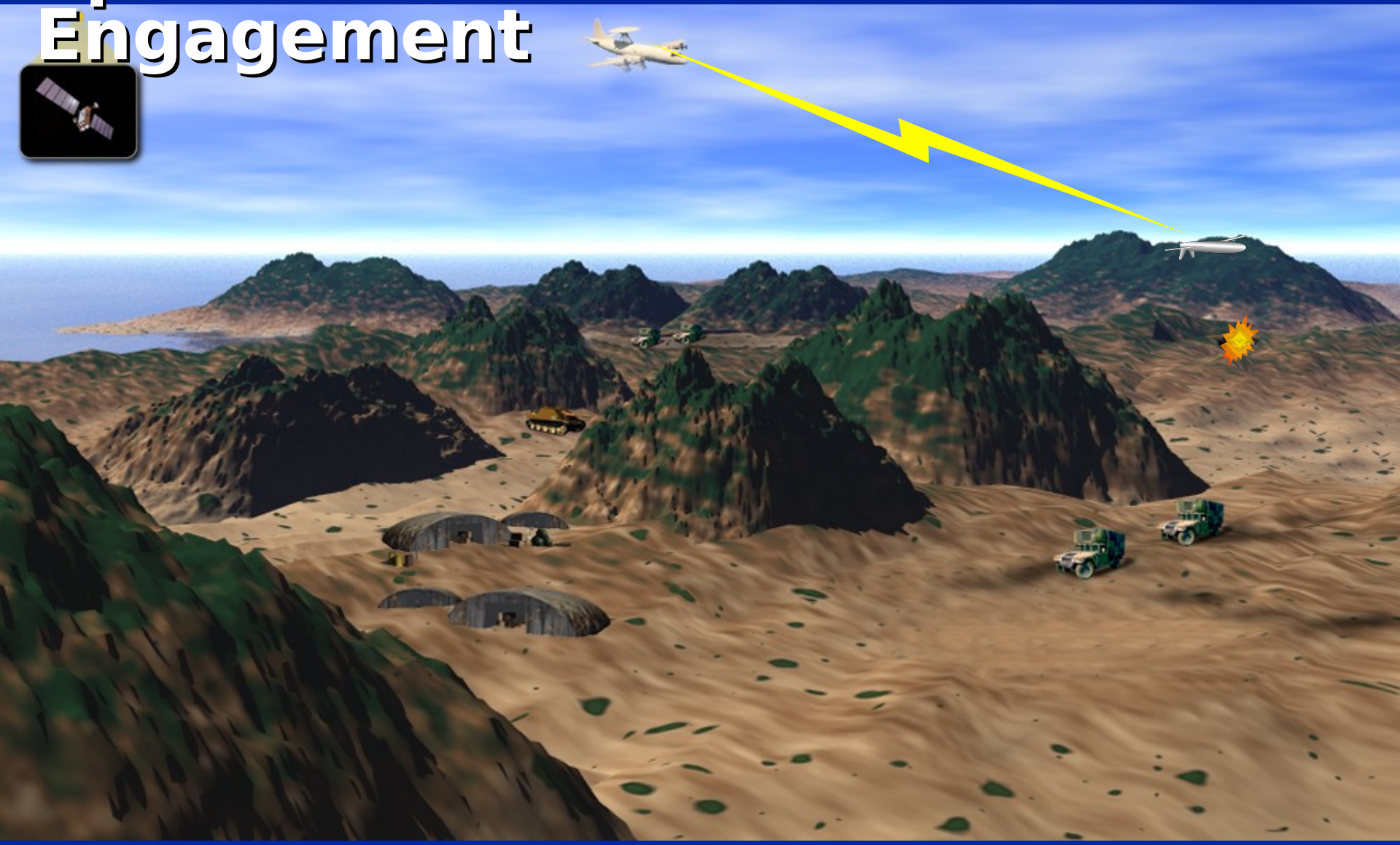

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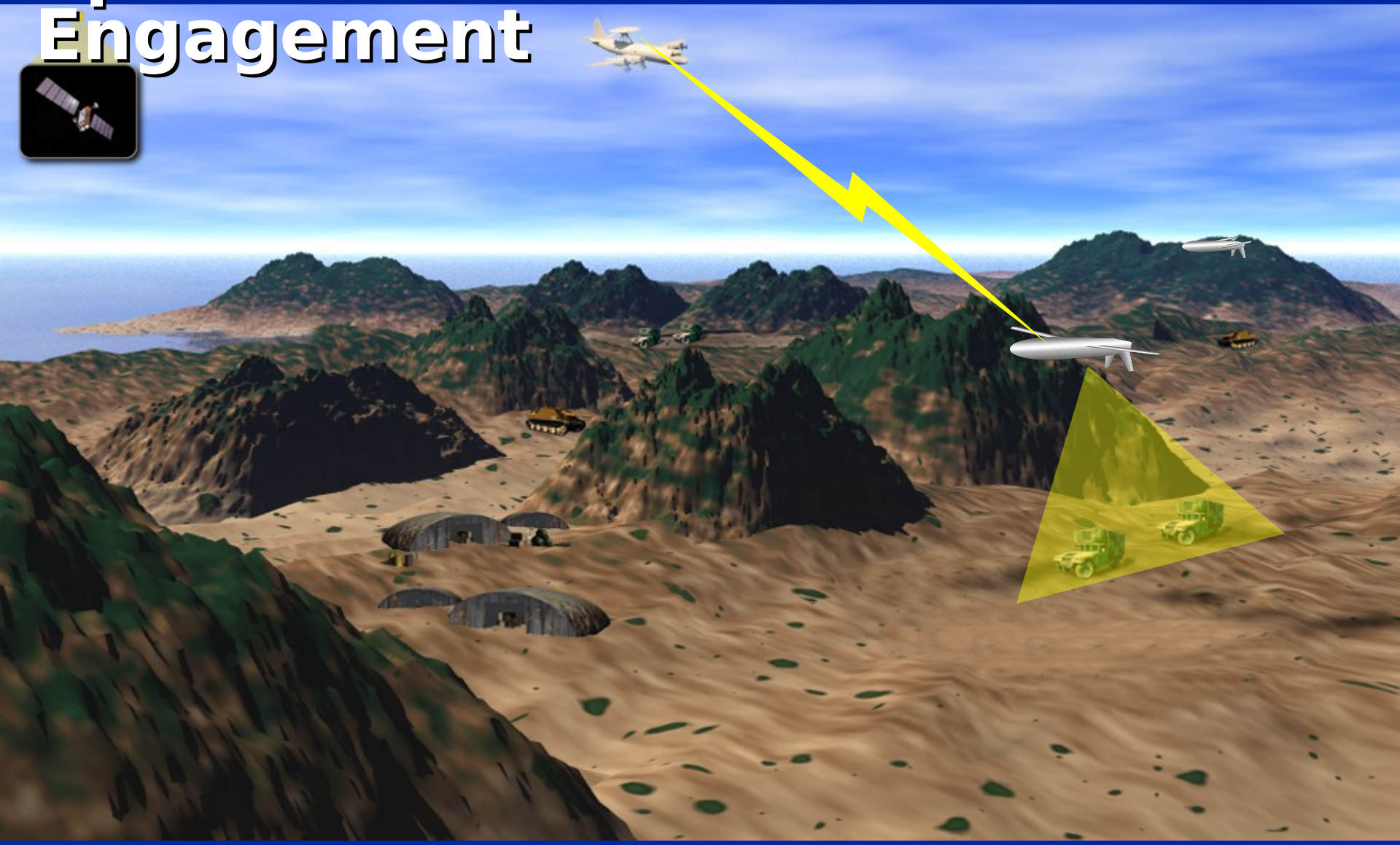

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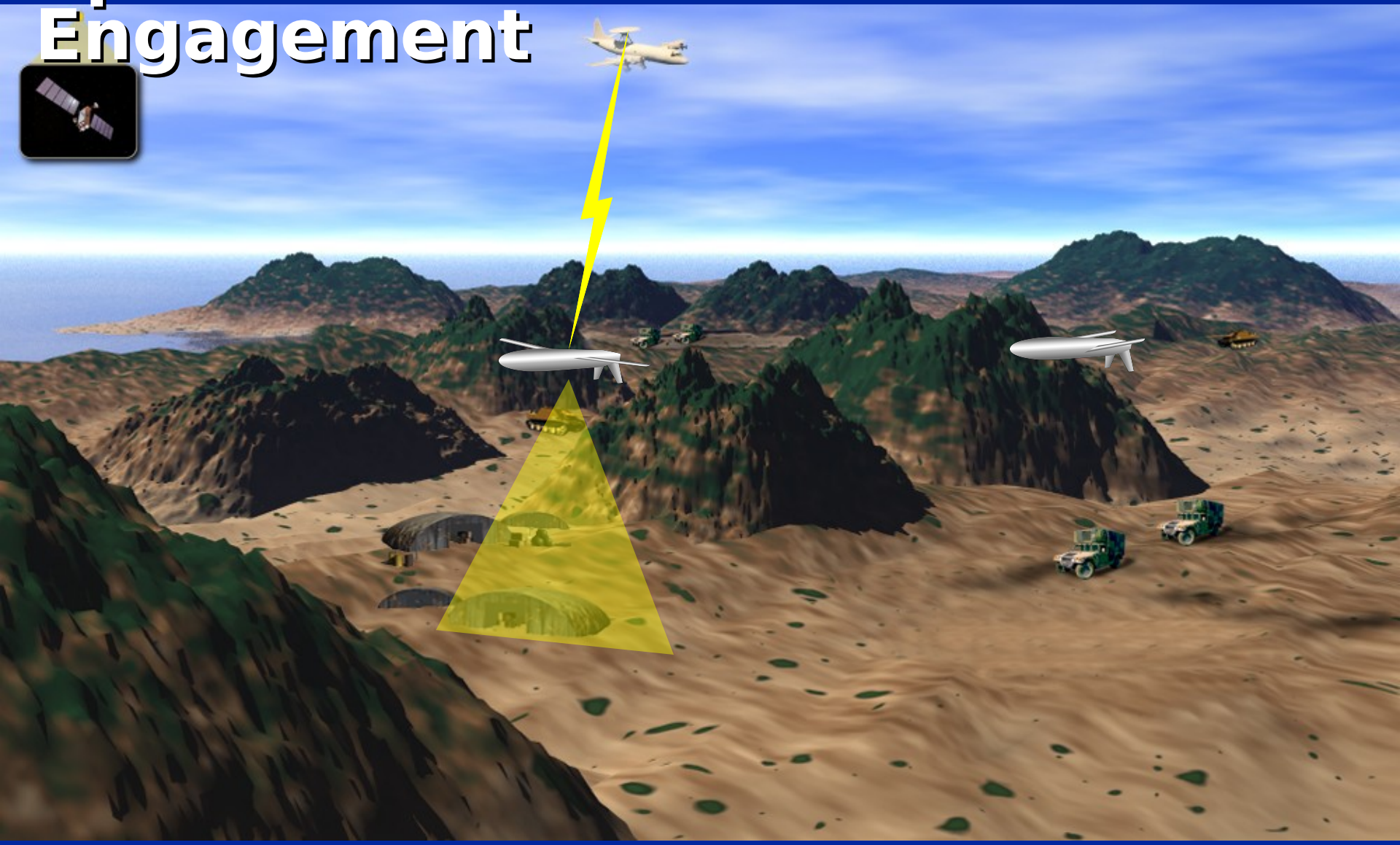

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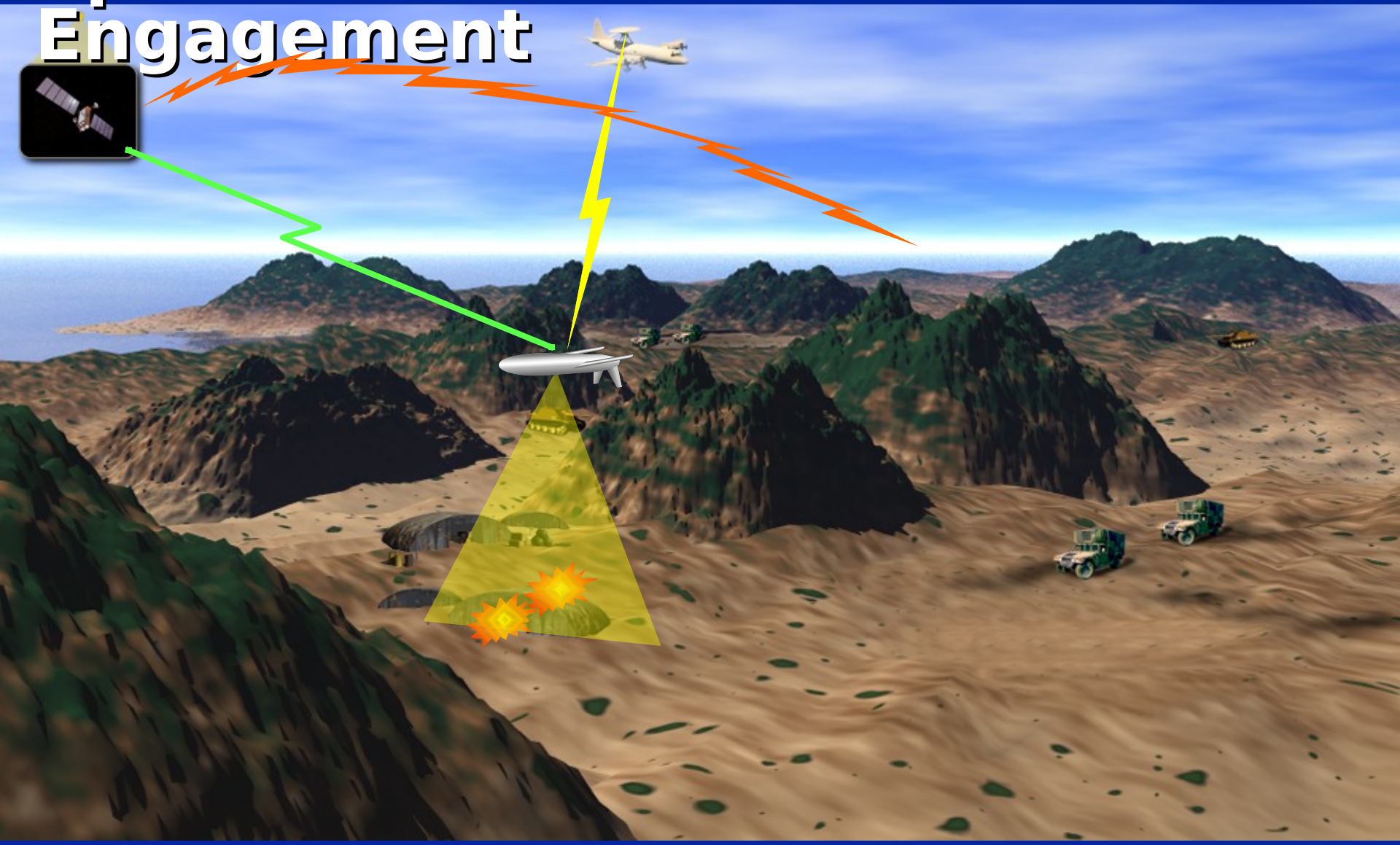

Summary

"Time" is the new challenge

- Today's seekers bring all weather, fixed & moving target capability
- Seeker should augment systemic ID
- Persistence can solve many problems
- Speed is a future and complimentary solution
- Ideal "Precision engagement" weapon:

"Surveilling weapon with persistence AND speed"

Industry Working To Provide Full Spectrum Of Options To The Warfighter